THE QUARTERLY MAGAZINE OF THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY
VOL.10/NO.4 SPRING 1972

Terra

My first impression was that of being lowered into a sea of green velvet . . .

A Full House

The annual Natural History Museum Open House February 4 hosted a full and happy house of Alliance members and their guests, about 3300 in all, twice the total of past years. Visiting Museum departments behind the scenes, guests saw otherwise off-limits areas and later shared conversations and refreshments. About half those present were Museum Alliance members' guests, whom we hope saw enough and enjoyed enough to lure them back to frequent Museum visits and permanent Alliance membership.

Museum Service Council: Off and Running

Interest in our Museum runs high, and so do the Museum's needs. Newly formed this year, the Museum Service Council seeks out the interested and able to fill the many needs of our Museum.

One of the most popular placements of the Museum Service Council has been volunteer aid to the new Gift Shop, where one may show an Indian mask, sell a blanket, enjoy the fascinating surroundings, all in the one day a week the Council suggests its volunteers offer. Trade is brisk, volunteer minds alert; the scene is enjoyment.

The commitment carries over into volunteer help for the curators. This is involvement in a different kind of action, seeing, touching, learning, cataloguing collections, studying the inner disciplines of each department.

The Museum Bookstore also claims its concerned volunteers, who help the thousands of visitors choose favored mementos or books. Metal models of sabre-toothed cats, sloths, camels, all found in the La Brea pits, fossil kits, slides, cards, are only a few of the Bookstore treasures attracting children as well as older visitors.

Museum Service Council members now have a fresh field to explore, new to them but venerable in the Museum's history—the Library. "To like the feel of books" is the volunteer qualification Librarian Betty Begun puts first. If one is hooked on books there's much solid work to be done, cataloguing, indexing, filing, sorting clippings, or working on some long-range project like the exchange program of scientific materials written by our own staff and sent to concerned institutions all over the world (including Peking of course). There's a big job for a history buff in unfolding bundles of newspapers from decades past—and reading a few views into the past in the bargain.

Response to the call from the Museum Service Council has been fine, but more help is needed. Call Fran Kellough, 749-3583, and put yourself on the best sacrificial block in town; after a bit of interviewing, you may rest secure that Belle Mintz (co-chairman of Museum Service Council with John Jones) will call you to come talk with her at the Museum. Once you're there, you may never want to leave!

Replicas of California Rock Art

Petroglyphs:

designs chipped in stone, have been duplicated through a three-dimensional process developed by Austin Dennison and carried on by Daniel McCarthy and J. Timothy Moore.

Museum Bookstore

Terra

The Quarterly magazine of
THE NATURAL
HISTORY MUSEUM
of Los Angeles County
VOL. 10/NO. 4 SPRING 1972

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FOCUS ON RINCON

AN UNTAMED CORNER OF THE RAINFOREST

Two Museum Entomologists Film a Documentary and Study Insect Life in the Costa Rican Jungles

Introduction by Julian P. Donahue

My little single-engined Cessna 180 shared the blue sky with a few cumulus clouds, while I shared the cramped quarters with the pilot and a miscellaneous cargo of supplies. Quite a change from the roomy 707 that had flown me from Los Angeles to San José, Costa Rica, the day before, in January of last year.

As I looked down, there was no discernible airport. Then, as we got closer, I could see it—now I knew how carrier-based aircraft pilots felt—as we had to place our fragile craft on a small field, not much larger than a ship's deck nestled in a sea of green. My eyes would have been tightly shut had I not felt the compulsion to take documentary photographs of the jolting, thudding, crunching landing on the grass strip carved out of the forest.

My first impression was that of being lowered into a sea of green velvet, not unlike the feeling that a diver in a bathyscaphe must experience upon descending into the emerald Caribbean.

No amount of reading could have prepared me for the more than 300 species of woody plants (including the *lianas,* or woody vines) that inhabit this corner of the earth. Or the incredible variety of epiphytes (plants that live on other plants, such as orchids and ferns), and a climate that boasts of over 120 inches (that's 10 feet!) of rain a year, with temperatures never falling below 65°F. And some of these trees, reaching over 100 feet towards the sunlight, were woody relatives of our sunflowers and sweet peas.

The locality has no name. It is a small airstrip approximately two miles west of Rincón, on the Osa Peninsula. Rincón in Spanish means "corner" (an inside corner), describing its location at the upper extreme of the deep Golfo Dulce, near the Panama border. The well-known port of Golfito, some 30 miles across the Gulf, that I had left only minutes earlier, is the chief Pacific banana port of the small country of Costa Rica.

The Peninsula is the largest primeval area left in Costa Rica. The forests are truly virgin, untainted as yet by the hand of man. A little human activity is evidenced by the plumes of smoke rising from the fires of squatters, and there is some agricultural activity near the coast. But essentially the entire area is one vast rainforest.

About 300 feet from the end of the runway I could see my home for the next six weeks: a small, white wooden structure standing at the edge of the clearing, operated by the Tropical Science Center. As I walked toward the building I disturbed clouds of butterflies—meadow satyrs, "88's" a tailed *Marpesia,* grass yellows, and others—butterflies of all sizes and colors, flitting in the grass and about the building on the edge of the forest. My lepidopterological heart leaped at the prospect of successful collecting. For this was the main reason that I had come to the Osa Peninsula—to obtain biological samples from an endangered habitat, for permanent deposition in the Museum's research collection, so that generations of scientists would be able to study the fauna of Osa long after the hand of man had irrevocably changed this unique forest.

Waiting to greet me, their smiles reflecting relief at my safe landing as much as their pleasure of my arrival, were Dr. Charles L. Hogue, Senior Curator of Entomology at the Museum, and Larry Savadove, from Alan Landsburg Productions. They had been at the station for a week, settling in for the long visit ahead. Hogue had become associated with Alan Landsburg Productions some months before, when plans were made to produce a documentary film series called "The New Explorers."

After greetings and unpacking, I grabbed my net and entered the forest for a quick survey, such was the lure of this huge green giant of a forest.

Walking into that forest was like entering a cathedral-sized greenhouse. I could almost *feel* the breathing of the plants as they exhaled oxygen into the mist-shrouded sky. Light filtered through stained-glass windows of dry red and yellow leaves. Dusty beams of light struck the forest floor through curtains of lianas. I walked through cloisters and corridors where monks seemed to murmur from the recesses of the forest. Pervading it all was the quiet background of organ music offered by the birds, insects, and frogs.

As entomologists, we were on the Osa to look beyond the profuse plant life. Our job was to look deeper, and to learn what we could of the insects that fed upon these abundant plants—and upon each other. When one knows what to look for, and how to look at it, a rainforest can yield remarkable treasures.

FOCUS ON RINCON

by **Charles L. Hogue & Julian P. Donahue**

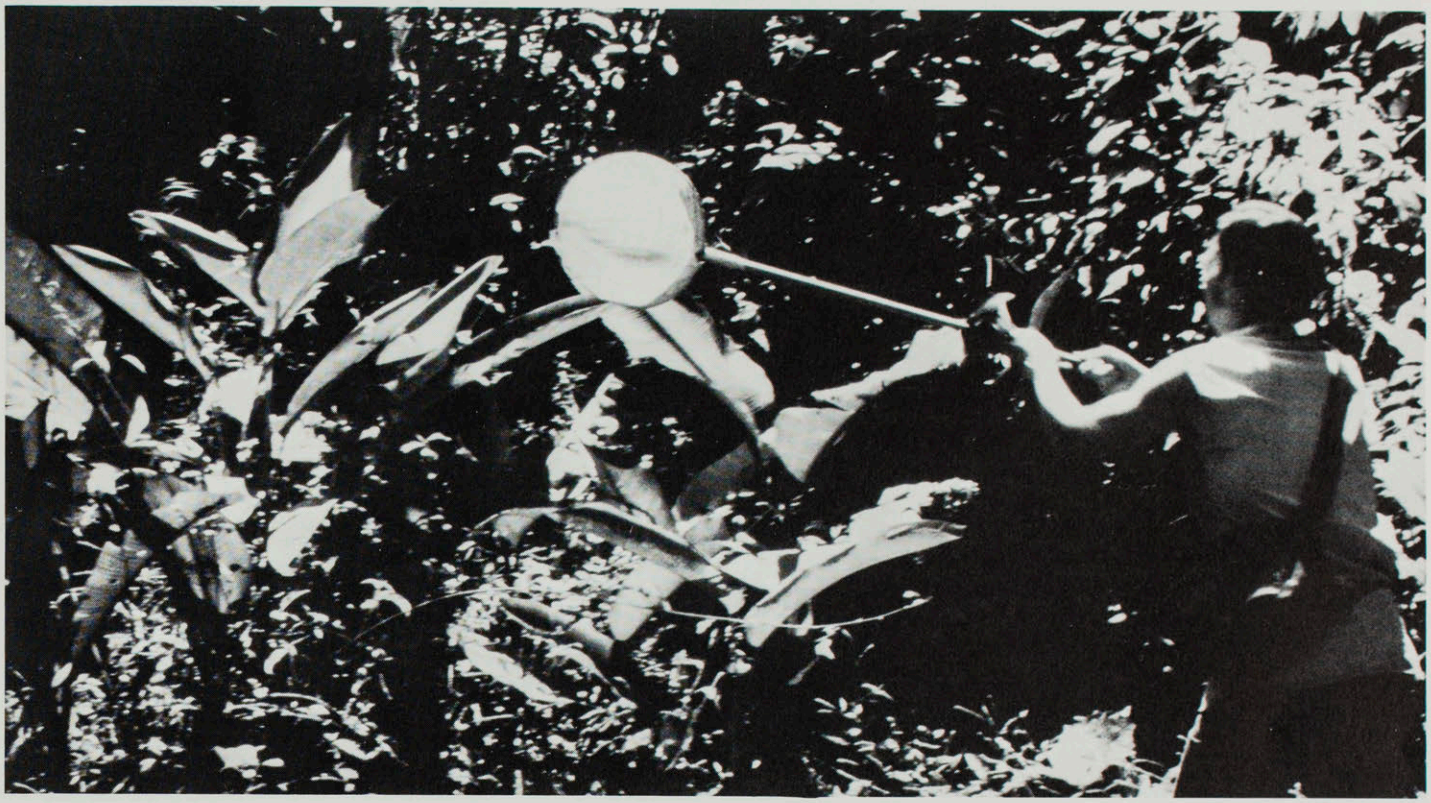
Thus two of the Museum's entomologists, Senior Curator Charles L. Hogue, and Assistant Curator, Julian P. Donahue, found themselves alone in this fabulous green corner of the Costa Rican rainforest. They share some of their personal experiences in the pages to follow.

If we were to characterize our adventure and impressions in one word, we would choose paradoxical.

One very anomalous aspect of our existence was that while we were living in a forest, unchanged since long before the time men lived in caves, civilization was only one hour away. We lived only 300 feet from the end of a jungle airstrip with two regular flights by a small plane each week from either San José or Golfito. It was these regular flights which kept us in constant contact with the outside world. We were connected by an aerial artery only 175 miles long to the capital city of the country. At the other end of that one-hour pipeline was the Organization for Tropical Studies, our logistical support and the backbone for our survival in the rainforest.

Although the regular airline flights to and from San José were our lifeline to the outside world, our day-to-day energy needs were provided by a small generator. It provided the electrical power to charge our camera batteries, and to operate our insect-collecting lights. Gasoline was required to run the generator, but because the airline would

A futile swing at a day-flying moth



not transport gasoline (it was a risky enough business just to fly the plane, without having to worry about gasoline on board), Hogue once had to make a special trip to Golfito to arrange for drums of gasoline, the first shipment of which he personally escorted by shrimp boat across the Golfo Dulce.

We had a small portable radio, but the surrounding hills and the sheer distance restricted reception to a handful of Spanish-speaking radio stations at night.

Thanks to the need for keeping photographic film cool in the hot climate, we were provided with the greatest luxury of civilization—a refrigerator (run on propane). This, a gas stove and electrical generator provided us with most of the amenities of home.

The airplane came every Tuesday and Friday. Every Friday the pilot delivered our shopping list to the OTS logistical supporters in San José. We received such staples as onions, potatoes, carrots, flour, and sugar without any difficulty. But there was, obviously, a nutritionist on the OTS staff who took a personal interest in our well being. Every week we received, unsolicited, 15 pounds of oranges, in addition to green beans and other vegetables that we had not ordered. When we asked for a few packages of salted peanuts, we got over 10 pounds of them—enough to last our entire stay, and then some.

As in so many other tropical countries, beef is cut without any bones, so it is virtually impossible to recognize cuts as we know them. In desperation, Donahue tried to potroast one particularly formidable piece of fascia-encased and gristle-ridden beef, with disastrous results. Thereafter, we ordered mostly ground beef, which yielded splendid culinary delights at the hands of chef Donahue.

Opening the boxes of supplies from San José was just like Christmas for us, for we never knew what we would get. If we were lucky, we got what we ordered, but more often than not we got strange things which we were totally incapable of identifying—much less cooking.

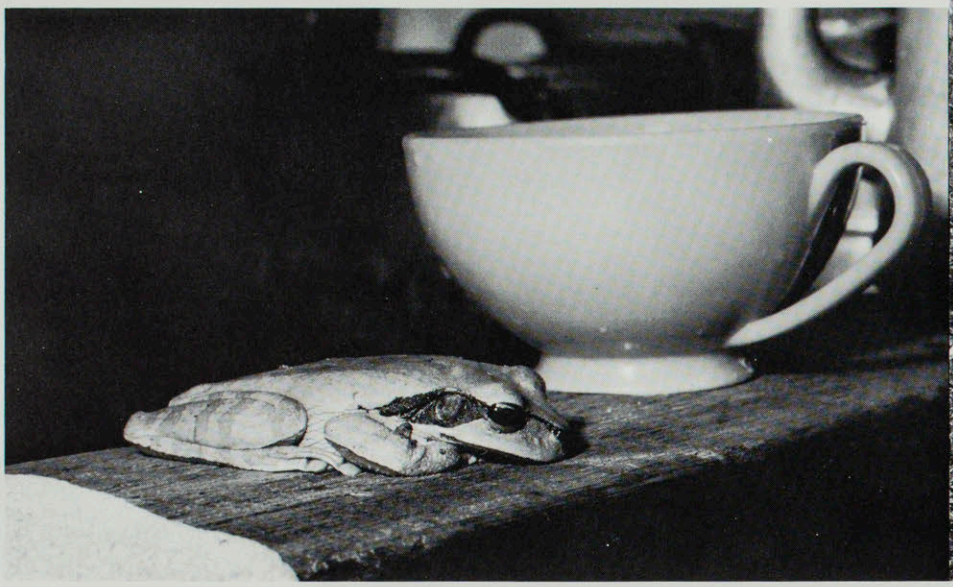
Fortunately, we had some help. Living near the station was the part-time caretaker for the landing strip, Señor Acón. Acón was an amazing man, almost 60, with great vitality and strength.

It was Acón who told us that the unfamiliar, fat, cucumber-like, spiny vegetable delivered to us weekly was "chayote." He showed us how to cook it, we tried it, and then gave him some 20 pounds of it on hand and a promise of all futures.

Acón also got our weekly allotment of an unsolicited pasty red substance

The "Conestoga Set,"
outside the research station,
where Hogue filmed captive insects.

Tree frog visits at breakfast time.



("achiote"), and the compressed cakes of "tamarindo," which likewise proved unsatisfying at the hands of the cook.

In turn, Acón shared with us the fresh meat he shot in the forest with his antique .22 rifle. Foremost among his targets was the peccary, or wild pig, often hunted with only dogs and a machete. Other wild game, such as the curassow and guan, great turkey-like birds, still persist on the Osa Peninsula, and are prized by the locals.

We ate delectable salads of fresh palm hearts, and tepezquintle made an unparalleled pot roast. And one day we had a roasted tinamou. The tinamou, unknown to most outsiders, is one of the most delightful fowl in the world—it would rival the duck and pheasant in popularity if it were more widespread and available. We had, from our first day, been entranced by their haunting whistled calls echoing throughout the forest.

In the rainforest all of the senses are assaulted by sights and sounds which seem to belong in the realm of interplanetary travel or science fiction.

A man raised in the rainforest, encountering civilization, might hear a cork being screwed into a tight-necked bottle, and say, "How like the katydid."

And so we made our reverse comparisons, for many of the sounds of the forest conjure up auditory memories from mechanized civilization.

We heard katydids whose voices are perfect mimics for the squeeky and scratchy emissions from a badly-tuned radio set. And frogs, which we called the "coke-bottle frog," whose tone is the exact sound made by striking a glass bottle with a sharp instrument like a knife—"tink-tink-tink." There are many bird voices which are harsh, scraping sounds, like the sound of two pieces of metal being dragged across each other, and one night we even heard one that sounded exactly like someone whipping a piece of sheetmetal.

Not just the sounds, but also the sights fit with this idea of the manufactured or artificial to describe the forest. The leaves of many of the trees, especially the understory trees, are so perfect in outline that they look as if they were stamped out of pieces of shiny metal. There are plants which appear to be made of rubber; they look precisely like the artificial plants that you can buy in stores. Many vines and aerial roots coming from the tall trees are elastic, like rubber bands. There are myriads of shiny butterflies and beetles with colors that are more brilliant than polished silver or gold, and others with painted patterns upon their wings that look as though they could only have been done by an artist attempting to

Box of Costa Rican
Moths from
Osa, 1971

clean his pallet.

At times we were ready to proclaim that nothing is as it seems in the forest. A leaf strangely glued to a tree or lying on the forest floor may turn out to be a moth with brightly colored hind wings. A mottled rock might turn into a frog. A dappled pool of light in the understory may suddenly transform into the rippled movement of a great jaguar. A leaf falling from a tree branch may in fact be a dawdling butterfly. A twig swaying in the breeze can in actuality be a predatory mantis or walking stick. A stick lying on the trail can be a sleeping bushmaster.

Woody plants are the most common and conspicuous. The flowering herbs are present in profusion but grow primarily not on the ground, as in the temperate and subarctic zones, but on the trunks and branches of the trees as epiphytes. The blooms of orchids and bromeliads vie with each other to attract the attention of their pollinators, and by doing so they attract yours. The bright splashes of colors of the passion flower and the *Sobralia* orchid draw immediate attention to their presence. When they're not blooming, they merely look like other vines and plants, sitting on the forest.

The flowers of the forest would seem to be put there for man's pleasure, but of course they're not. An orchid expands its fleshy pastel petals and sends its invisible odors into the forest to attract flying insects. The principal pollinators of many of the large orchids are brightly colored, metallic blue-green bees.

We had a unique chance to see these bees at their work by placing an artificial orchid extract inside the flowers of a *Sobralia* orchid, which was growing on a fallen tree near the station. We were amazed at the sudden arrival of the orchid bees. They came and visited the flowers before our eyes and camera, dipping their tongues, longer than the lengths of their bodies, into the throats of the orchid flowers. We spent a whole day in fascinated observation and photography. Slow motion captured the ballet dance of the bees in front of the flowers.

While sights such as these frequently caught Hogue's attention, his camera was directed principally at ants, and of these, the army ants. This is the type whose marauding habits have earned them a special place in fictional literature. Readers may remember the famous Carl Stephenson short story, "Leiningen Versus the Ants," which inspired numerous fantastic misconceptions and sensational accounts including the movie, "The Naked Jungle."

The really dangerous animals are not the venomous snakes and large predatory mammals, but the minute biting flies

Text continued on pg. 10

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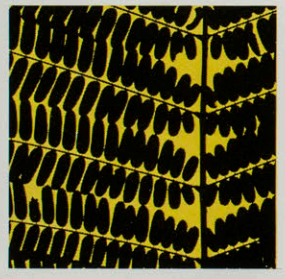


The flowers of the forest would seem to be there for man's pleasure . . .

A leaf looking like it
was stamped from rubber

Bagworm

which come to visit in the night. Mosquitoes and various other kinds of blood-sucking flies, that we pass off as only noxious at home, in the tropics carry debilitating and deadly diseases, such as malaria and yellow fever.

At Rincón there are moth flies, *Phlebotomus,* which harbor the protozoan organisms causing leishmaniasis, which if injected into your skin eat it like some living acid. There is also the human bot fly, or tórsalo as it is called in Costa Rica.

Hogue and Savadove learned first-hand of the latter. Apparently they were visited one evening, before Donahue arrived, by a mosquito bearing eggs of this fly, and were inoculated with the maggots, which lie within their egg shells waiting for the heat of the human body to stimulate them to hatch. The maggot burrows into the skin and develops over a period of weeks into a huge grub the size of your thumb, and if allowed to mature, produces a bumblebee-like fly. About three weeks later, Hogue noticed an itchy sore on the top of his foot that would not heal, and one day saw something moving inside of it. On closer inspection with a hand lens, Donahue informed him "there's something alive inside there," and it turned out to be a tórsalo. Hogue, as a student of medical entomology, was at first pleased at this close communion with parasitic insects and opportunity to witness their effects, but, "it hurt!" and often bled profusely. Again Acón came to the rescue, this time with advice on the local custom for removing the maggot.

He advised that a piece of bacon be tightly bandaged over the worm's small breathing hole and to leave this poultice on for 24 hours. Hogue carried out this procedure and was successful in popping the maggot out.

Savadove was less fortunate. After returning to Los Angeles, his unwelcome guest had to be surgically removed.

The tropical rainforest has a peculiar mystery built up around it, because of its imposing grandeur and somberness; to some it seems foreboding and evil. When one enters the forest, it's only with trepidation unless one goes prepared with knowledge and a mind open for discovery.

From the air or from the outside, the forest looks closed and remarkably uniform except for perhaps differing shades of green. Inside, however, it is a wonderland of life. The multitude of woody trees, shrubs and vines surround you as you stand in the forest, though you can't easily identify the leaves or flowers of the different kinds, because they tower out of sight above the canopy and often are confusingly intermingled.

"army ants"—workers attacking Katydid prey

Hercules beetle

Much of Hogue's time was spent in locating the ants. They are not abundantly common and finding a colony is difficult. The best way is to walk the trails or along the stream beds which run through the forest. Fortunately at Rincón there were a number of native trails and small streams that he used in this manner.

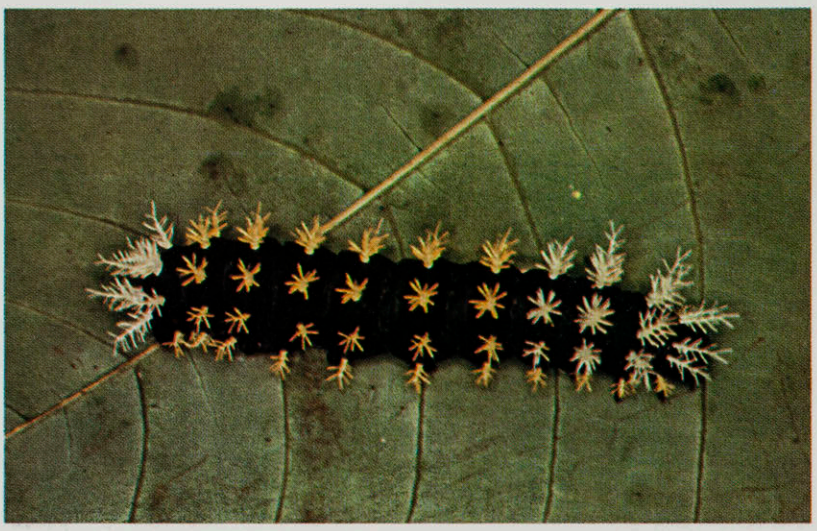
Eventually, during a day's scouting, if enough miles are covered, the searcher will stumble across a column of these ants. These columns are connecting links between the raiding party of swarming ants at one end and the main colony at the other end. Unlike most other ants these have no permanent place of abode and alternately move from one locality to another depending on the stage of development of immatures in the colony. During one period of two to three weeks, the colony remains stationary at night, taking the form of a huge mass of intertwining bodies, secreted in a well-protected place, usually underneath a fallen log. This mass is called a "bivouac," an analogy to the human military counterpart. Following the stationary phase, the entire colony moves to another locality, each day migrating through the forest, and a new bivouac is made each night in a new place. This migratory phase likewise lasts a period of two to three weeks.

Virtually every day, during both stationary and migratory phases, a raiding party, or swarm of ants, emanates from the bivouac to catch and gather prey. The latter consists of small insects that live on the forest floor and the lower branches of the vegetation—insects such as grasshoppers, katydids, cockroaches, spiders, and many others. A favorite food of the army ant at Rincón was the larvae and pupae of paper wasps. The ants raid a wasp's nest and rob it of all its juvenile occupants in just a few minutes. The adult wasps flee in terror; if they attempt to ward off the attackers, they are stung and instantly killed.

Other ants cultivate fungus gardens, live in hollowed-out acacia thorns and cecropia tree trunks, milk caterpillars of honeydew or catch prey in "bear trap" jaws. All proved worthy actors in the drama which Hogue was attempting to develop.

Hogue's subjects were diurnal, and he had to go to the forest in the daytime to capture them on film as they performed their daily activities. But Donahue had the easier job: at night he turned on his black lights and mercury vapor lamp, and the moths came to him. It was not as easy as it sounds, for he had competition. Besides attracting insects, the lights also attracted the predators of insects, and Donahue had to

Katydid



Automeris caterpillar—poisonous spines

compete with whip scorpions, bats, and giant toads as big as a football in order to get the specimens he required for his scientific work.

The moths of Costa Rica, as with most other groups of tropical animals, have great diversity. There are very many species, but most of these species are relatively uncommon. Although he collected for six weeks, very rarely did Donahue get more than half a dozen specimens of any particular kind of moth. And he needed an adequate sample to get some idea of the range of variation within a species.

But why the great interest in the moths of this region? The moths of Costa Rica, in fact the moths of anywhere in America south of the United States, are still very poorly known. There are hundreds, if not thousands, of undescribed species unknown to science, living in precarious balance with an endangered habitat. These moths, and other insects, must be sampled and recognized before they are gone from the face of the earth forever—otherwise Man will have never known that they existed.

Authorities have stated that by the year 2000 there will be no tropical rainforest area left undisturbed by the hand of man. The forest of Rincón hopefully will be one of the last to go, and if the efforts of conservationists can succeed, perhaps the entire area will be spared the destruction which is so common throughout the world.

The fruits of our expedition were nearly as numerous as the fruits within the forest. The thousands of feet of film taken have been condensed to an hour television special to be aired sometime in 1972, while the over 9,000 insects that Donahue obtained will be studied for years to come by entomologists throughout the world.

Charles L. Hogue came to the Museum in 1962 as a recent graduate from the department of zoology at U.C.L.A. Since that time his interest in tropical entomology has matured. His research on the burrow associates of land crabs, primitive stream dwelling flies and other special topics have taken him to many areas of Central and South America and East Africa. He is presently working on a general field guide to insect life in tropical America. Dr. Hogue's daily tape recordings of his Rincón expedition have been edited and will appear soon as a book.

Julian P. Donahue joined the Museum staff on July 1, 1970, with chief responsibility for the collection of butterflies and moths. He received his undergraduate training and an M.S. at Michigan State University; he is now completing the requirements for the PhD. His collecting trips have taken him throughout eastern North America as well as the Philippines, Indonesia, Ceylon and India. His current research interests center on the systematics of certain groups of Oriental and New World moths.

Dr. Hogue's is the second in Alan Landsburg's coming "New Explorer" programs. The series will consist of a number of one-hour films ("docu-dramas") covering the adventures of scientists from all backgrounds who have been asked to choose parts of the world that are still so isolated from man that they are virtually unspoiled and still retain their pristine nature. The scientists are asked to live several months in these areas and carry on whatever investigations they feel are worthy and to make a film record and diary of the entire experience. Each explorer is equipped with Beaulieu camera equipment and the necessary accoutrements of life and of his discipline, laboratory equipment and so on, so that he may carry on his work to the fullest extent possible, yet still have time to act as his own cinematographer. The first of the series, produced in association with Dr. Theodore Walker, was a detailed ecological study of Lake Eva, a remote lake located on Baranoff Island in the Peril Strait near Sitka, Alaska.

NEW ETHNIC ARTS SHOP

1. Ibo Mask, Nigeria $67.50
2. Tonala Animals, Mexico 12" $7.00, 2½" $1.20
3. Wooden figure, Peoples Republic of China $2.00
4. Pre-Columbian Reproduction $6.00
5. Bone and Fur Animal Figure, Nigeria $1.00
6. Articulated Enamel Fish, Peoples Republic of China $9.00
7. Jade Pin, Peoples Republic of China $37.00
   Carnelian Bracelet $75.00
   Carnelian Ring $23.00
8. Yoruba Ibeji Twins, Nigeria $298.50
9. Navajo Indian Sand Painting $12.00

Photos by Armando Solis

TOPS

By **Robert Wade**

"As young striplings whip the top for sport on the smooth pavement of any empty court"—Virgil

What makes a collector? Why is one person's trash another's treasure? Why are objects used in one culture's kitchen displayed as art on another's mantel? And what makes dusty unloved possessions in the attic suddenly worth thousands of dollars?

The questions are intriguing. The article below will give us some answers. We hope, by readers' submission for publication of letters and articles on the subject of personal collecting, to receive still more insights into the magpie instincts of this marvelous breed who seem to enjoy the intellectual quest as much as the physical acquisition of objects, and without whom museums throughout the world would be poorer.

As a young boy I was fortunate to live in a house with a large wash room with a cement floor where I could spin tops during the evening hours after we had listened to "Amos and Andy" or "One Man's Family." Marbles I could not master, jacks were for girls, but tops—there was a sport!

Late in 1969 during a luncheon discussion with fellow staff members in the History division of the Natural History Museum of Los Angeles County, I brought up the subject of disappearing children's games and stated that spinning tops had all but vanished from the playgrounds. This statement was challenged, and a wager was made. I'm glad to say that I lost the bet. However, it took my friend some eight or nine months to find a top which he had said could be found anywhere. One bright morning in the summer of 1970 there on my desk was a new string top that he had at last found. Much to my surprise, and I think also the staff, the memory of how to wind the string and spin it had not been forgotten. That evening while spinning the top in my patio my nineteen-year-old son expressed amazement that the "old man" had such talent and could teach him how to spin a top.

The realization that top spinning was a rapidly disappearing game set me and my wife, Addie, on a new hobby of collecting tops and gyroscopes, a hobby which has led to some interesting experiences and new-found friends. One of the nicest aspects of our collecting is that many of my friends and colleagues at the Museum have become interested in our collection and have picked up some beautiful tops for us in Japan, Costa Rica, Mexico and Africa.

The most unusual top in the collection is a monstrous wooden peg top fourteen inches high, nine inches in diameter, which weighs nine and one half pounds. The only information the antique dealer could give us was that it was listed in the estate he had purchased as a "clown's top." However, in further research Addie found reference by Brand in his book *Antiquities* to a "town top about the size of a bucket" being lashed or whipped by three men, for these monstrous tops were started by spinning and then kept in motion along the roads by being struck with whips. In England "town tops were kept in the villages to be whipped in frosty weather so that the peasants might be kept warm by exercise and out of mischief when they could not work." Also, in the same reference, is a quotation from *Poor Robin's Almanack* for 1677 stating in the "Fanaticks chronology" that it was "1804 years since the invention of the town tops." We like to think that our monster might be a town top.

Whip tops have been around for some time. In a painting by Pieter Brueghel entitled "Children's Games" painted in 1560 there are boys whipping tops. Cato, the Greek philosopher, admonished youths to "play the top and shun the dice." Perseus in his third "Satire" says "the whirling top they whip and drive her giddy till she falls asleep."

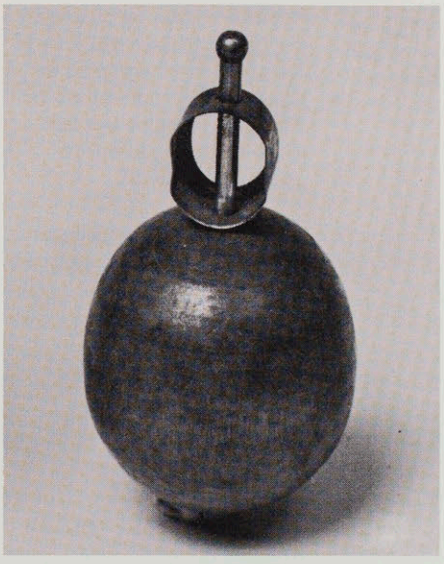
For a top to "fall asleep" means that it appears to be still in its spinning motion. When a top is spun it travels while spinning in a circular path, but the momentum of the spin will eventually bring it to a vertical central location. Here it will remain steady and spin quietly and vertically until its velocity and momentum die down, and the process is reversed. The top wanders and finally falls over. During its vertical and steady spin it is said to be sleeping; hence, the old saying for a good night's rest: "I slept like a top."

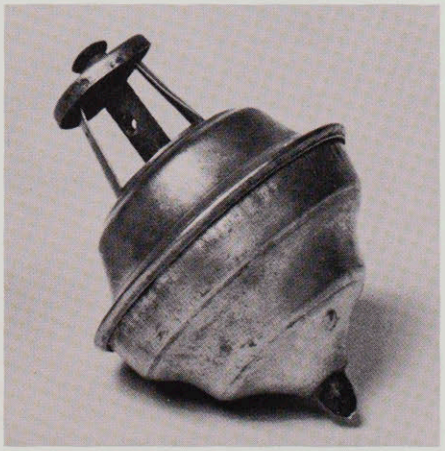
In Japan, top spinning attained the same national status as kite flying in China. There are dynasties of families in Japan who have passed the art of spinning tops down from one generation to another, spinning them on the edges or points of swords, spears or strings. Matsui Gensui, a medicine peddler who adopted top spinning as an attraction to gather crowds at Asakusa, Edo, was the greatest top spinning genius. On November 13, 1826, when Shogun Iyeshige visited Asakusa Temple, Gensui was selected to entertain the august person with his top spinning. The name of Matsui Gensui was held by successive top spinning masters. Gensui Matsui XIII and Kakujiro Natsui were invited to visit the United States to make a tour of the country. They arrived in 1866 and did not return home until 1869. The Japanese tops are exquisite in their workmanship and design.

A museum friend on our Alliance Board brought me a group of very interesting whistling tops from Jakarta made of bamboo, and I was fascinated to receive a top from Mexico of the exact same design from my brother while he was on a trip there.

I think that the charm of a spinning toy like a top or a gyroscope is that it represents nothing more than a physical force. There is no relation to a familiar object like a model automobile, ship, airplane or train, therefore the pleasure is that the top is just "doing its thing"—spinning or humming.

Speaking of gyroscopes, the inventor of the gyroscope is reputed to be the French scientist Jean Foucault. He used

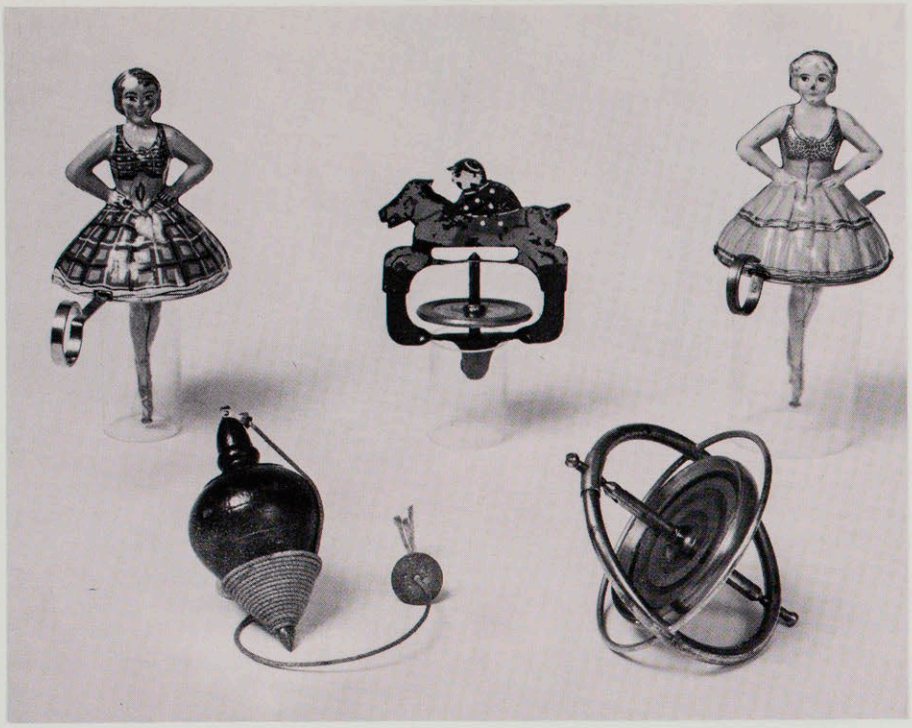




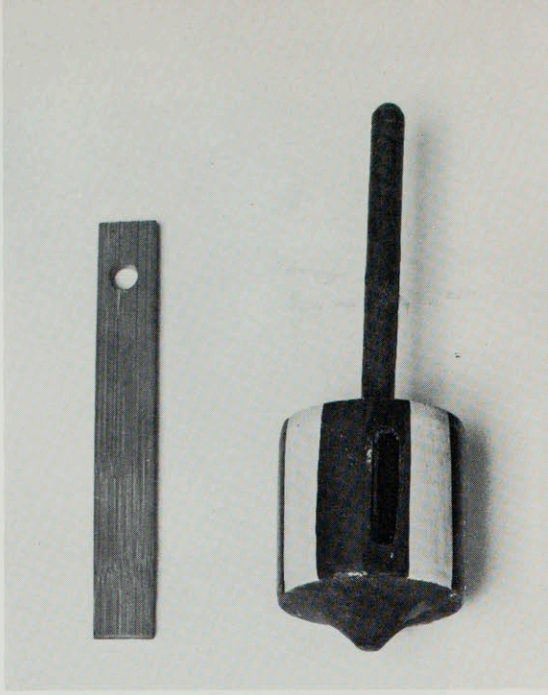
Self-winding tops—the string is attached to the central shaft and when spun rewinds back on itself. The one on the left has a patent date of 1899 stamped on the side.

The Alouette circa 1900

A variety of Japanese tops



The dancing dolls and the jockey on the horse spin on the same principle as the gyroscope on the lower right. The top on the left will spin horizontally when held in mid-air by the string.



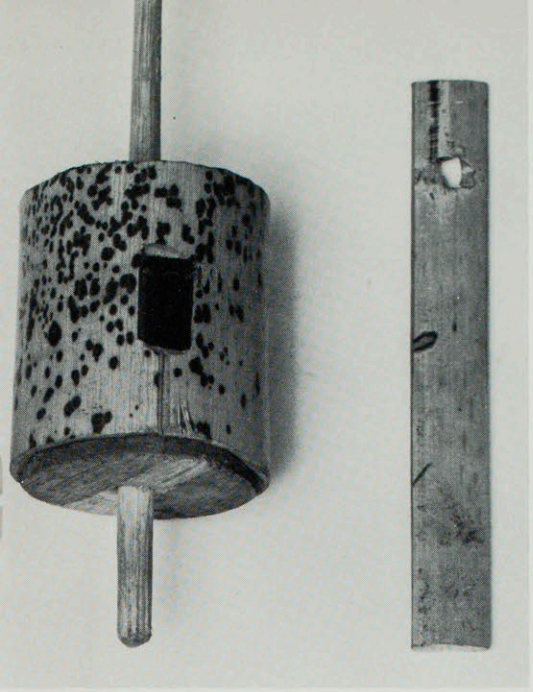
Whistling tops made from sections of bamboo. The one on the right is from Indonesia; the one on the left is from Mexico.

These are spun by threading the string through the hole in the stick, then wrapping it around the spindle of the top. The stick steadies the top when the string is pulled.

Boys whipping tops from *Games and Pastimes of Children* by Jacques Stella, 1657. The caption read:

This whipping top, unkindly used,
Although by lashes stung and bruised,
Turns a deaf ear and starts to drowse;
And so these toddlers are impressed
That whips, which ought to wake and rouse,
Now serve to set their tops at rest.

A group of metal whistling tops. Some are spun by springs, others by twisted wire or string.



The pride of the collection—the "clown" or "town" top beside a standard size Mexican peg top.

it to explain the spinning of the Earth which of course is the biggest top of all. He was also the inventor of the Foucault Pendulum on display at the Griffith Observatory which also demonstrates the rotation of the earth.

Among the treasures of our collection are two dancing ballerina dolls with gyroscopes inside their skirts causing them to pirouette when a key is pulled through the cog wheel gear. Another gyroscopic delight is a horse and jockey stamped out of tin which race around a metal track or a drinking glass.

The gyroscopic principle for spinning toys is still in use. Many new modern toys are crank-wound or battery-powered space stations. One of the most delightful spinning toys we have found is the Alouette, a flying toy invented in France in 1787. Powered by string, spring or rubber band, it is like a four-bladed propeller. When spun, it rises from its handle and flies across the room like a tiny helicopter. We are now on the track of two uniquely powered tops—one spun by mercury flow and the other with a gun powder charge.

Other spinning toys we have found are the te-totum, the whirligig, the diabolo and the yo yo. The te-totum, or sometimes called "put-n-take," is a finger top with four flat sides each marked with a letter: T for take all, H for half (half of the stake), N for nothing and P for put down (that is, a stake equal to that which you put down at first). Other te-totums have more sides and the letters P and T alternately, hence the name "put-n-take." One of our put-n-takes is the smallest top in our collection, being only one half inch in diameter, and is cast in metal. It is said to have been carried by a soldier in World War I to pass the time in the trenches.

Whirligigs are extremely varied in description, but as far as I can discover they consist of a cardboard disk or some device like a button strung on a loop of string suspended horizontally between the middle fingers of the hands. After having been twisted, it is twirled by a pumping action as the string is pulled and relaxed and the disk rotates forward and backward.

Diabolos are unique toys popular around 1900. Essentially a tapered spool (like two tops joined at the point) it is spun on a string attached to two short sticks, juggled and tossed into the air and recaught on the string. The original game called "Koen Gew" is said to have come from China and an off-shoot of it "was enjoyed by Napoleon and his French court."

Yoyos, popular in the 1930s, are still spun in contests sponsored by recreation clubs, the novelty being the various manners in which they are handled.

Even social commentary is reflected in tops. At the risk of arousing the ire of Women's Lib, I quote from a little book published by the Society for Promoting Christian Knowledge in London in 1901 entitled *Spinning Tops* by Professor John Perry M.E., D.Sc., F.R.S. In a discussion of the phenomena of spinning bodies, he says: "The instinctive craving to investigate these phenomena seems to manifest itself soon after we are able to talk, and who knows how much of the intellectual inferiority of woman is due to her neglect of the study of spinning tops."

Robert Wade is Chief of the Exhibitions Division of the Museum of Natural History where he has served for some twenty-five years. This is his second article for Terra.

Fig. 1. Village scene with three houses and 61 persons. Diameter 13 in.; clay, painted red, white and black. Nayarit. Coll. Dr. and Mrs. George C. Kennedy.

A "Ceramic Picture Book" of the Ancient Villages in Western Mexico

by **Hasso von Winning**

The mortuary clay figures of West Mexico have been aptly called a "ceramic picture book" which illustrates a wide range of socio-cultural patterns of village life that persisted during the centuries just before and after the beginnings of the Christian era. Specifically, these figures—grave offerings from shaft-and-chamber tombs—portray the physical appearance of the early inhabitants, their clothing, ornaments, artifacts and weapons, and the animals in their environment.

The current exhibit of West Mexican figurative art is not intended to duplicate previous efforts but attempts to emphasize select aspects by concentrating on group representations of figurines attached to clay slabs or platforms. Justification for the selection of a typologically limited segment is twofold. First, we have available a considerable number of figurine groups because of the gracious cooperation of collectors in the Los Angeles area. Second, the groups make a contribution toward our scant knowledge of the ethnography of the area, which is solely dependent on interpretation of archaeological remains.

To be sure, the impressive large tomb figures do convey in themselves a wealth of information but they are actually statues—that is, isolated images disassociated from their social context. On the other hand, the complex figurine assemblages and the animated house models provide a glimpse of the interaction of individuals in a group. They are a unique contribution, mainly of the Nayarit region (Ixtlán del Rio), and virtually peerless in the entire New World cultures before European contact.

An inventory of extant sculptures—those in this exhibit and in other collections—reveals a considerable variety in subject matter but, nevertheless, a recurrence of basic patterns dictated by conventions. Similar configurations suggest themes, the interpretation of which is unfortunately not supported by external pictorial or literary aids. Five broad thematic categories can be distinguished for present purposes: (1) Scenes depicting everyday activities in a village, (2) animated house models, (3) scenes depicting ceremonies, (4) groups of animals, and (5) figures of individuals lying on their backs on a platform or bed. Each of these categories will be briefly discussed, keeping in mind that they are merely formal divisions with some degree of overlapping.

I. *Village scenes.* Effigies like these consist of platter-size slabs with models of huts on their periphery and a large number of human figurines engaging in different activities typical of daily life in a village. All components were hand modeled and, before firing, attached to a flat base or platform with short supports. Hence, all the figurines and objects are in a fixed position and immovable.

One of the larger assemblages contains three huts or houses with 61 persons which, at a glance, gives the impression of a cluttered and confusing arrangement (Fig. 1). Nevertheless, if one considers the gestures, poses, and direction in which the individuals are gazing, certain clusters become evident which indicate that their placement followed a preconceived plan (Fig. 2).

This and other village scenes show purely domestic activities: men, women and children walk, sit or lie down; they gaze in various directions, play musical instruments (drums, rasps, rattles, flutes), carry weapons and various ob-

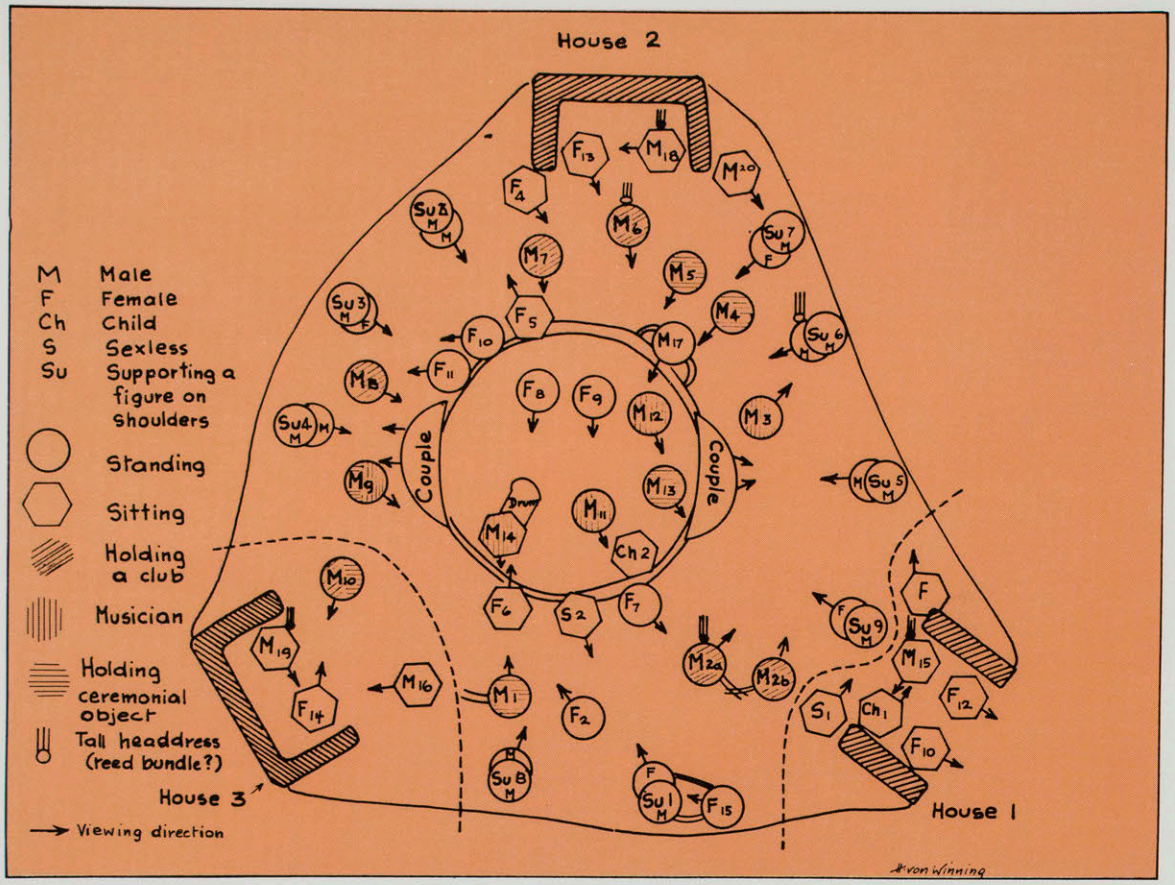


Fig. 2. Schematic distribution of the figurines in the village scene fig. 1.

jects, or just sit in a contemplative mood. Generally, the people are crudely modeled and disproportioned; yet their lack of refinement is fully compensated by the variegated poses and actions which lend these figures a lively appearance (Fig. 3). Dogs and platters of food occur frequently and enhance the domestic atmosphere.

Smaller groups suggest family scenes. A man, woman, and child sit together at leisure. In front of them is a water jar and a dish or two piled high with food. Occasionally the head of the family sits under a sunshade. Other groups portray women kneeling in front of metates, grinding corn.

Privileges concomitant with rank distinctions are evident in effigies that show a chieftain seated in a covered palanquin carried by four servants. These are restricted to Colima.

II. *House groups.* The term "house group" has become established among collectors of clay models of houses or huts. Thematically they are related to the village scenes; however they are single units in which the human figurines were attached mainly inside and outside of the dwellings.

House models with their occupants are also a unique feature of Nayarit and occur nowhere else in Mesoamerica. They range in length from 2½ to 12 inches and represent huts and houses made of wood, straw, and sun-dried bricks. The figurines are similar to those in the village scenes. The outside of walls and roofs is painted with geometric designs among which one motif is quite frequent and symbolically significant. It consists of an upended square containing concentrically-arranged smaller squares that resemble the god's eye motif. This motif occurs sporadically all over the world and is generally believed to possess magic qualities. The present-day Cora, whose ancestors originally inhabited the region where the house models occur, still believe that the god's eye motif prevents the return of the souls of the dead on paths that are undesirable. It is a motif of great antiquity and in early times was believed to prevent diseases, to insure good crops, and to enable the shamans to explain mysterious phenomena. As decoration on the house models it was probably intended to protect the dwellings and their occupants from harm.

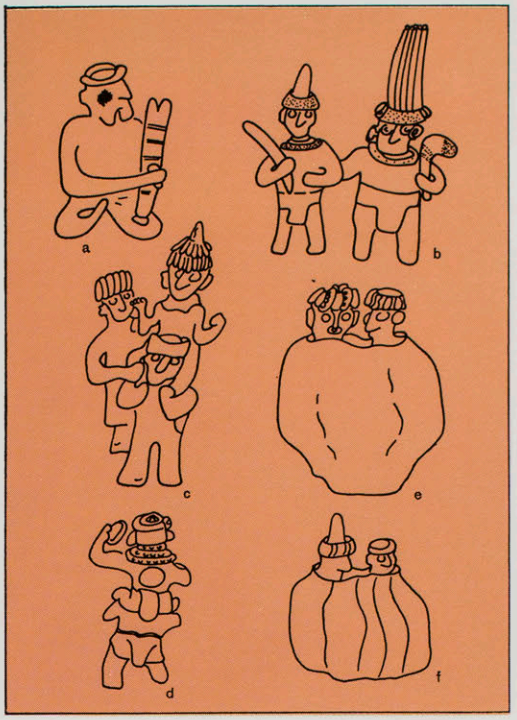
The resourcefulness and skill of the ancient builders is impressive and is evident in the various architectural designs. Altogether over 80 house models have been analyzed and grouped into five types of constructions (Fig. 4). The preservation of the clay models is of singular importance since no archaeological remains exist of comparable structures dating from the shaft tomb period (200 B.C.—500 A.D.). Large masonry constructions, such as stone-faced pyramids and quadrangular temple complexes, belong to a later date. The different types are as follows:

(1) The simplest models consist of a floor slab with two walls that support the roof. There is only one chamber, which is open in front and in back. The roof in most Nayarit houses is constricted in the middle so that the crest and base extend laterally. The upper ridge of the roof projects at each end (Fig. 5).

(2) A more common type is a single-chambered house, like the one described above, which is placed on a raised platform with two or three inserted steps.

(3) Unusual is a small house with three walls to which is attached a smaller chamber with a separate and lower pyramidal roof. The annexed room contains a sleeping or sick person lying on its side (Fig. 6).

(4) Numerically predominant are two-



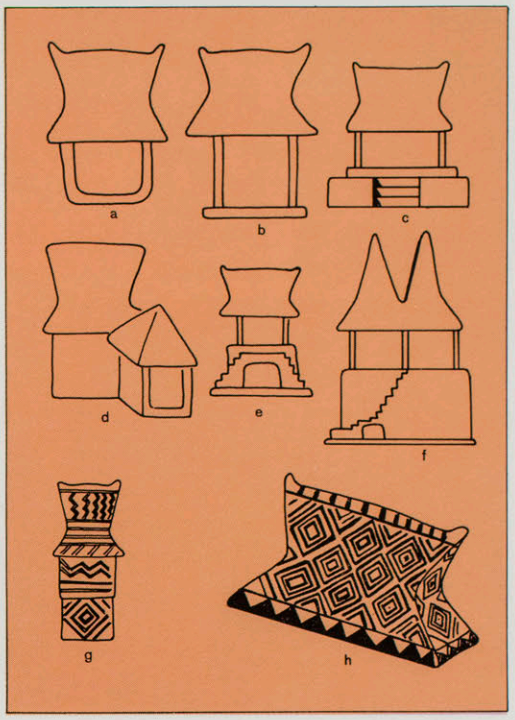


Fig. 3. Figurines in Nayarit village scenes (not to scale). a. Rasp player with deformed mouth. b. Two dignitaries. c,d. Person supporting on his shoulders a straddling adult. e,f. Pair covered by a blanket, probably representing a marriage ceremony.

Fig. 4. House models from Nayarit (drawing not to scale). a,b. House type I. c. House type II. d. House type III. e. House type IV. f. House type V. g,h. Exterior painted decoration representing the "god's eye" motif.

storied houses—an indication of advanced construction methods. The basement is hollow and accessible through a rectangular doorway. Stairs are attached laterally or in the center and lead to the main room which consists mostly of two walls and a roof. The number of steps varies and is irrelevant since they are carelessly modeled. The height of the steps exceeds their width, which is a common feature of stairs in Mesoamerican pyramids. Quite striking is the frontal symmetry of these house models (Fig. 7).

(5) Finally, two-storied complex buildings with several rooms and two or more intersecting roofs and several exterior stairs probably represent dwellings for village chiefs and their families (Fig. 8).

The variety of constructions is unusual. In other areas of Mesoamerica the common people lived, as far as we know, in simple huts of more or less uniform design. The human figures convey by their poses and actions domestic activities similar to those in the village scenes. Dishes with food, water jars, dogs, and occasional parrots occur also. Household furniture, such as metates and four-legged benches, which are known to occur with large tomb figures as symbol of rank, are lacking.

III. *Scenes depicting ceremonies.* A number of groups indicate that the individuals are engaged in ceremonies of various kinds rather than in domestic activities. The participants are attired like those in the village groups and are not distinguished by attributes that would suggest their being priests. Images of deities are also lacking. It must therefore be assumed that the ceremonies are related to civil affairs, although intermingled with a certain degree of religious motivation in order to placate the gods.

(1) *Ball court scenes.* The Mesoamerican ball game is a case in point. It was played for entertainment, but it was also a religious ritual performed in formal masonry courts. Those of the Classic and Early Postclassic periods were very elaborate. Various forms of the game are implied in architecturally different configurations of the court and in the placement, or their absence, of markers and stone rings through which the ball had to pass in order to score. In Nayarit no masonry courts of the shaft tomb period have so far been discovered. For this reason the clay models showing the ball game in progress are particularly interesting, inasmuch as the shape of the courts conforms architecturally to the general pattern of the Classic period courts at archaeological sites. Therefore, the Nayarit ball court models probably belong to the terminal phase of the shaft tomb complex.

The number of players varied between two and eleven. The ball—originally of solid rubber—is larger than the head of the figurines which represent the two teams. Rings were apparently not used; instead a number of hemispherical markers are distributed along the longitudinal axis of the playing field. The spectators sit or stand on the high walls flanking the court.

(2) *Man balancing on a pole.* Several models show a tall pole in the center of a circular slab (Fig. 9). On top is a male figure, lying on his stomach, while three or four similarly attired persons—his team mates—stand around the pole or assist him to climb it. The spectators stand on the periphery, sometimes between small huts. The existence of at least eight such models, with different details, indicate that pole scenes portray an established ceremony rather than a curious event modeled by an imaginative potter.

The pole ceremony was probably related to the *Volador* game, a ceremony still performed by the Totonac and

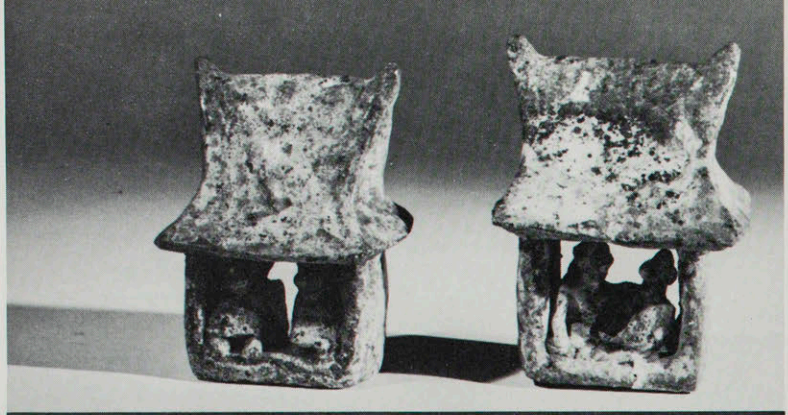


Fig. 5. House models with occupants, type I, 5 in. high. Coll. William P. Palmer.

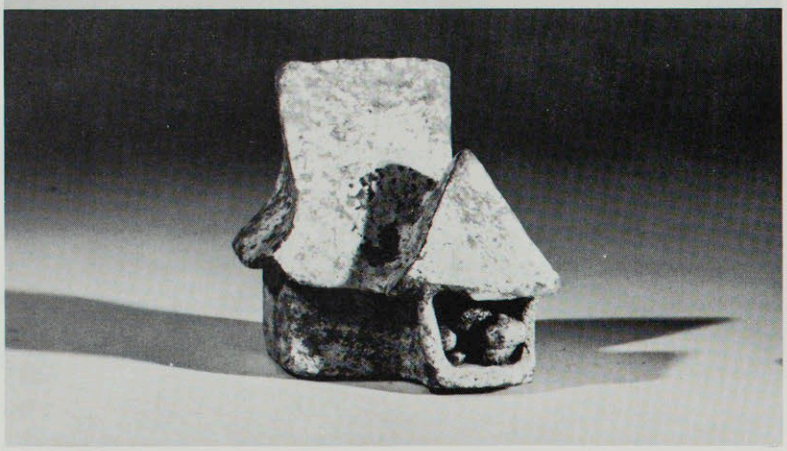


Fig. 6. House with annex containing a sleeping person, type III, 5 in. high. Coll. Alfred Stendahl.

Fig. 7. Two-storied house with 8 occupants, type IV, 9½ in. high. Coll. Alfred Stendahl.

Otomi, in which four men attired in bird costumes are tied to a frame on top of a pole. While their ropes unwind they slowly descend, simulating the flight of birds. Meanwhile a fifth individual stands on a very small platform on top of the pole. The symbolic meaning of the later Prehispanic ceremony is related to a fertility cult and expresses the divine provenance of the crops.

(3) *Funeral processions and mourning scenes.* Great stress was placed by the early inhabitants of West Mexico on mortuary ritual, evident in elaborate shaft tombs and the large number of aesthetically and technically superior tomb figures. It is therefore illuminating to encounter also representations of funeral processions and groups of mourners contemplating a corpse. In four assemblages a large cylindrical object, decorated with upward protruding crests, is being carried by six or eight persons to a hut with a similar crest on the roof. Conceivably this cylindrical object—the contents of which is not visible—denotes a catafalque or false mummy bundle about to be laid in state. The pallbearers are accompanied by a large number of men and women, some of whom carry food and folded blankets on their head.

In several other smaller groups the gestures of the participants indicate strong emotions. They are surrounding a person stretched out on the ground who had apparently died only recently (Fig. 10).

(4) *Dance scenes with musicians.* Circular slab mounted groups depict mostly individuals who link their arms or place them on their neighbors' shoulders while musicians play on drums or flutes or shake rattles (Fig. 11). Sometimes the figurines have whistles incorporated in their heads. The formal arrangement in an orderly circle of alternating male and female figures suggests a ceremonial rather than a casual gathering.

(5) *Processions in single file.* A similarly orderly arrangement is seen in a group of persons standing or walking in single file in which each person holds on to the shoulders of the one in front. Occasionally a flute player leads the group (Fig. 12). These may be simplified renderings of processional ceremonies.

(6) *Blood-letting and cheek perforation ceremonies.* Ritualistic mutilation of the mouth and the piercing of cheeks was a custom limited to Nayarit; numerous large tomb figures portray individuals who had undergone such treatment. In rare instances up to four persons—men and women—were "connected" by a long tubular object penetrating their cheeks. Whether these doubtlessly very painful mutilations were practiced voluntarily as a penitential rite or whether they were inflicted as punishment, perhaps of captives, is not known.

A few small groups show the performance of a cheek-piercing operation, and one very interesting large assemblage portrays, in four different scenes, how the cheek piercing was performed in successive stages during a funeral procession. Perhaps the victims in this case were the retainers of the deceased.

IV. *Groups of animals.* Of all the animals only dogs and birds (almost exclusively parrots) were portrayed in group assemblages. These sculptures are rather whimsical and show, for instance, three birds drinking from a bowl, or four birds about to take off, or a dog suckling her puppies. Larger assemblages show up to sixteen birds, some perched on the roof of a hut, apparently waiting to be fed.

V. *Figures lying on a pallet or bed.* The figurine complex of West Mexico includes a category which shows a person lying on his back, tied to a slab or a device that resembles a couch or a bed. Therefore it would seem logical to in-

Fig. 8. Two-storied house with 2 stairs, several rooms, 9 occupants and platters of food. Red, yellow, black and white decoration. 6¼ in high. Coll. Alfred Stendahl.

Fig. 9. Pole ceremony with 3 poles, 2 houses, 18 persons. 6¼ in. high. Red, white, yellow and black. 9 in. diam., 14 in. high. Nayarit. Coll. Dr. and Mrs. George C. Kennedy.

clude these "bed figures" in the present exhibit, although by their poses they do not suggest activity. Bedsteads, in the modern sense, were not used in Precolumbian times when people slept on mats or blankets on the floor as many Indians still do. The figure of a person laid out horizontally, whose arm and sometimes leg movement was inhibited by straps, had therefore a specific purpose and meaning (Fig. 13).

Some of these figures are recognizable as infants in their cradles. They occur in various types in the Valley of Mexico in an almost uninterrupted sequence from about 500 B.C. to the Conquest. Numerous examples are known from Chupícuaro (ca. 400-1 B.C.) but they are far less frequent in Colima, Nayarit and Jalisco.

Relatively abundant in the latter three regions are adult female or sexless persons attached to slabs. These are not always strapped—some are covered by a blanket—and they show regional style differences as well as a variety of features (Fig. 14). Without going into further details, which will be discussed at length in the forthcoming catalog, it is suggested that the individuals represent women who died in childbirth and are awaiting burial.

Other figures are doubtlessly patients on sick-beds since they lie on specially constructed beds with facilities for bowel incontinence (Fig. 15). These are rare and occur only in Nayarit.

VI. *Conceptual origins.* In Mesoamerica large village and ceremonial groups as well as animated house models are restricted to a relatively small area of Nayarit. Figures strapped to pallets and somewhat different house models occur also in Ecuador. Furthermore, house models and complex figurine assemblages are known from South America.

It is therefore tempting to postulate that the creation of these sculptures was not an autochthonous invention of the people of Nayarit, but that the concept was introduced from abroad and that it was adapted with modifications to local culture patterns.

For over two millennia prior to European contact occasional sea voyages were made between Ecuador and the West Coast of Mexico. As a result over 60 archaeologically documented traits, including shaft tombs and bed figures, were introduced from South America. Their spread from south to north is implied by chronology. However, formal differences between the comparatively fewer Ecuadorian house models and those from Nayarit, and the absence of village assemblages in Ecuador, do not speak for their South American origin but point to Chinese sources.

In China the looting of tombs for their valuable mortuary offerings had been a matter of serious concern since earliest times. To prevent the desecration of cemeteries and the loss to the economy of costly articles, official decrees were issued to discourage the burying of wealth with the dead. By the 6th century B.C. the substitution of terracotta carts and straw images of men and houses became established custom. The burial of genuine objects was not entirely discontinued but their replacement by valueless replicas was demanded even from the higher classes during Han times (202 B.C.—9 A.D.). Documents of the period state in many instances that persons gave explicit orders to be interred with mere clay imitations of their possessions.

From the Chou and Han periods are known various clay models of dwellings, farm yards with cottages, watch towers, etc., some of which contain numerous persons and animals. Also comparable to the Nayarit village scenes are the large bronze drums from Yunnan province, with sculptured representations of rituals, war and market scenes, that

Fig. 10. Mourning scene. 5¼ in. high. Nayarit. Coll. Milwaukee Public Museum.

Fig. 11. Dance group, 14 persons with whistles in their heads. Red brown. 10 in. diam., 7½ in. high. Colima. Coll. Dr. and Mrs. George C. Kennedy.

Fig. 12. Two dancers following a man blowing a conch shell trumpet. 3 in. high. Colima. Coll. Milwaukee Public Museum.

include houses, large numbers of persons and animals.

The problem of transpacific contacts between Asia and the New World is no longer a matter of whether they existed—a doubt raised by opponents because so far no remains of indubitable Mesoamerican origin have been found in Southwest Asia—but a question of what, when, and how. In the case of house models and village groups the parallels are impressive, particularly because they are not single, mainly stylistic, traits that occur in both areas, but complex assemblages whose contemporaneity is established. It is therefore highly probable that the concept—although not the actual clay sculptures—was introduced directly from South China to West Mexico. This conclusion was also reached independently by Wolfgang Marschall ("Beiträge zur Untersuchung transpazifischer Kulturbeziehungen," Munich 1972, in press), who summarized his analysis as follows: "The mortuary cult of China and West Mexico indicates, by tomb design and offerings, many specific, but separately independent, trait correspondences, which in my opinion can only be due to diffusion of all of these concepts. The chronological sequence implies that the transmittal proceeded from South China to Mexico."

Summary. To sum up, the purpose of the current exhibit at the Natural History Museum is to present a select category of West Mexican ceramic sculptures which, more than any other aspect of figurative art, portrays the interactions among the ancient villagers. The models show seemingly carefree individuals engaged in various activities of everyday life, their dwellings, games and ceremonies, their funeral processions and mortuary customs. As such, these clay sculptures are a unique descriptive phenomenon whose conceptual origins can be traced in part to Ecuador but mainly to China.

Hasso von Winning published numerous articles on Mesoamerican archaeology and is Contributing Editor for the Handbook of Latin American Studies. *He is the author (with Alfred Stendahl) of "Pre-Columbian Art of Mexico and Central America" (Abrams 1968). A long-time resident of Mexico, where he studied archaeology and participated in excavations, he is now Consultant in Mesoamerican Archaeology for the Southwest Museum at Los Angeles. His most recent contribution to* Terra *was* The Ancient Art of Veracruz.

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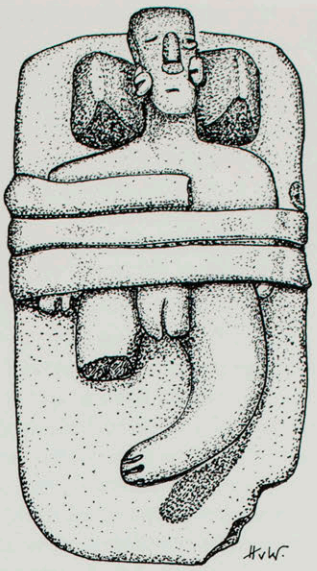
Photo credit: Julius Shulman, Los Angeles, fig. 9. Milwaukee Public Museum, figs. 10 and 12.

SUGGESTED READING

Sculpture of Ancient West Mexico; Nayarit, Jalisco, Colima. The Proctor Stafford Collection. Los Angeles County Museum of Art, Los Angeles 1970 (includes "The Pre-Columbian Art of Western Mexico," by Michael Kan and "The Ceramic Mortuary Offerings of Prehistoric West Mexico: An Archaeological Perspective," by Clement Meighan and H.B. Nicholson, and a comprehensive bibliography).

von Winning, Hasso and Alfred Stendahl, *Pre-Columbian Art of Mexico and Central America.* New York, Henry N. Abrams, 1968.



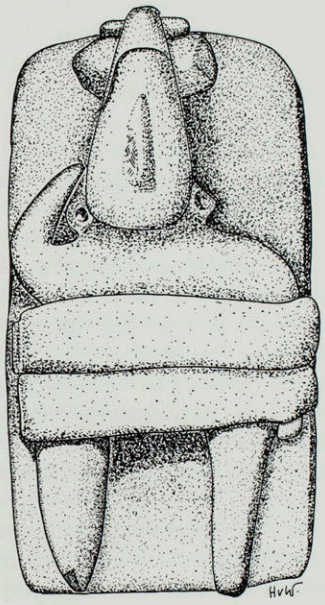
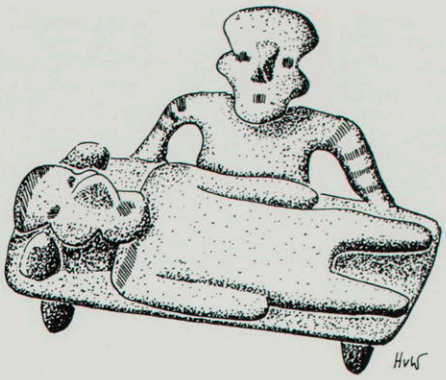


Fig. 13. a,b. Female figures tied to slabs. Buff. 4½ in. long. Nayarit.



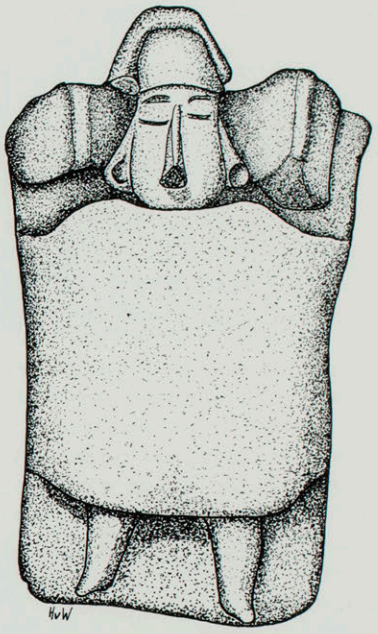


Fig. 13. c. Sick person with attendant. 5½ in. long. Red, yellow and black, Nayarit.

Fig. 14. Person under a blanket. Brown with black stripes on blanket. 3¾ in. long. Colima.

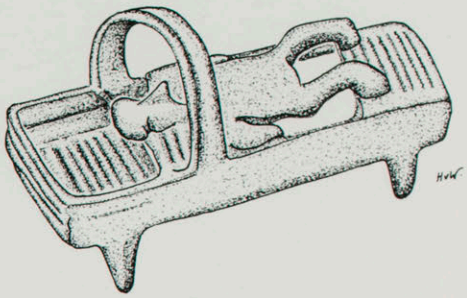


Fig. 15. Person on specially constructed sickbed. Red, yellow and black. 7¾ in. Nayarit. Coll. William P. Palmer.

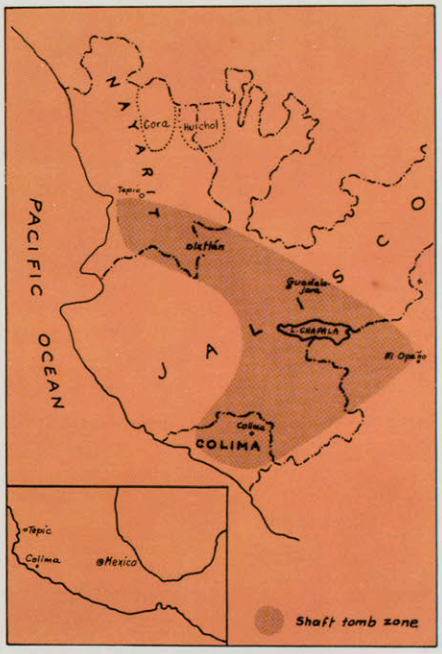


Fig. 16. Map.

GINSENG

WONDER OF THE WORLD

By **William A. Emboden, Jr.**

Wonder of the world, man-root, man-essence, thunder-bolt root, seed-of-the-earth, holy herb, Five fingers, Tartar's root, soul of Jasper are all names which have been used to describe *Panax ginseng*. This demure herb of the woodlands of temperate Asia has held the esteem of Chinese as the single omnipotent medicinal herb for almost five thousand years.

Legend has it that a young and beautiful maiden married into a noble family and after several years she remained barren. Prayer at the temple was of no avail, so according to tradition her husband was free to take a concubine, thus degrading the wife. One night in a dream this tortured woman had a vision of an old man who told her to go into the mountains and dig the root of a man-like plant and make a tea of it. Acting upon this revelation she went into the mountains and found ginseng from which she made a pleasant tea. Ten months later she gave birth to a son, and out of gratitude she made a journey into the mountains and encountered the old man of her dream (being the god of longevity). She thanked him and he in turn presented her and mankind with more ginseng so that happiness and fruition might prevail.

At one time only the Emperor had the privilege of collecting this root to which is attributed fantastic powers of allaying fatigue, staying the infirmities of age, increasing mental capacities, prolonging life and dissolving tumors. Ginseng, or *shin-seng*, has commanded higher prices than any herb in the history of the world and has enjoyed a greater popularity than any other "medicinal" plant. This sovereign remedy for the ills of man was given the generic name *Panax* by Linnaeus who drew upon the Greek *Panakos* meaning "panacea" in deference to the miraculous powers ascribed to the *"jin-chen."* A history of all Chinese medicine is traced to the legendary emperor Shen-Nung who is said to have lived almost five thousand years ago. This oral tradition passed into the hands of a succession of Chinese herbalists until it appeared in written form in the 1st century B.C., but the greatest exponent of the root was Lao-Tsy who extolled its virtues and showed the people of south China where they might gather the miraculous root.

Chinese legends surrounding the origin of the root are several; it is said to grow where a bolt of lightning has struck a clear spring, and the fusion of fire and pure water produce the "earth-essence." Others maintain that the "spirit-of-the earth" called to a man to free it. Such an imploring voice is to be heeded only by a virtuous man, for he may then be possessed of supernatural powers. If he should approach the plant with a vessel of pure white jade and take from it a drop of "blood" he will have the power of making himself invisible. However, should a man wanting in virtue seek this herb he may be swallowed by the air around the plant and killed, or may be devoured by the tiger-guardian of ginseng. At least, misfortune will befall the errant one and he will become lost in the forest.

Shortly after the appearance of some of the first Chinese pharmacopoeias in the first century, the ginseng legends became so well known that collecting was rampant. Wars between the Chinese and Tartars were generated over ginseng territory, and one Tartar monarch built a wooden wall around an entire province in order to protect this valuable herb. In China, ginseng depots for storage of the dried roots were established and it became necessary to protect these with armed guards. Exportation of the root from China has been a capital crime during several dynasties. Well-formed roots, i.e., those in the form of a man, were so sought after that one emperor is reported to have paid $10,000 for a single root from Manchuria, and another is said to have paid $25,000 for a perfect root from the same area.

The doctrine of signatures which has several independent traditions states that a plant is to be used according to the virtues which are revealed in the forms of its parts. Hence a tooth-like root of *Dentaria* was for toothache, a cordate leaf was to ease the heart, and so forth. Thus, it follows that a root formed like a man must certainly heal all of the body's infirmities. Several such plants have been found, including mandrake *(Mandragora officinarum)*, and briony *(Brionia dioica)*. As might be expected, as cultures mingled their lore was exchanged and one legend became inextricable from another. Thus, similar legends exist for both mandrake, briony and ginseng. One such tale concerns the gathering of ginseng in the dark, for reason of a light which emanates from the flowers growing in loamy forested areas. Arrows must be shot at the plants at night so that they might be easily located on the following day. This legend shared by both the mandrake and ginseng seems to have some substance in that "glow worms" or the larvae of certain phosphorescent beetles feed upon the mandrake foliage and may also be predators on ginseng leaves. However, an alternative explanation of recent origin states that ginseng takes radioactive materials from the soil which causes the plants to glow; this has yet to be substantiated, but it is not inconceivable. Claims have been made to the effect that the efficacy of the root is based upon its radioactivity. This phenomenon would of necessity be limited to soils which were radioactive; ginseng roots in my possession were subjected to geiger-counter analysis and revealed no activity. Perhaps they were not collected by a virtuous man!

Confucius had much to say in praise of ginseng's curative powers around 500 B.C. In the 1st century B.C. both the *Pen ts'ao Ching* and the *Y-Lyn*, the latter authored by Shi-Pao-Yunan, record specific curative powers for both the root and leaves of "jin-chen." Since the forests of eastern Asia were being denuded of these precious plants which require six years to form a root of appreciable size and quality, new markets had

to be sought. By the late 16th century the 52 volume *Pen-ts'ao-gan-mou* penned by Ly-Shi-Chzhen gave detailed prescriptions for using the root and the market value soared. New markets had to be sought outside of existing territories in which the plant was indigenous. One such site was found about 200 miles north of Vladivostok near the Amur River but it could not begin to fulfill the needs of the entire Chinese populace.

Europe first heard of the fabled ginseng in 1642 when the voyager Samedo Alvaro informed the West of the fantastic healing root. Because there was traffic between North America and western Europe, the legend soon spread to the colonies and curiously they had already discovered the Indians using a remarkably similar root called *garantoquen* meaning "human form" for stomach disorders, sore gums, menses and as an aphrodisiac. Thus, a M. Sarrasin in 1704 took ginseng roots from North America back to Paris where they were regarded with more esteem than curiosity; the potential market in North America could not be disregarded in light of the sums such roots were bringing in China. The Academy of France asked M. Sarrasin to present a paper on this New World variety of ginseng; a paper which did not see publication in the Memoirs of the Academy until 1714, the same year in which Father Jartoux, a missionary to China, published an article on Asiatic ginseng in the journal of London's King Society. Certain discrepancies between the two species were obvious, but the similarities were similar enough to present prospects of economic gain in the Americas. Father Jartoux indicated that the Chinese had accorded him special privileges in his study of the herb and he related its efficacy in treating both mental and bodily disease. Father Lafiteau, a Jesuit priest residing near Montreal, and a friend of Father Jartoux, asked for a sample of the root, having read his friend's paper. In 1716 this root arrived from China and the search began. Since the woodlands of Canada were ideal in their temperate climate and loamy soil for the growth of ginseng it was anticipated that the root might well flourish there. American ginseng, christened *Panax quinquefolium* by Linnaeus in 1753, was so prevalent in Canada that by 1718 the Jesuits shipped their first boatload to Canton. At that date sales were five dollars per pound—a substantial financial gain for the Jesuit order. Boston sent its first load of gin-

Ginseng legend: (I) The barren wife with her hand-maiden seeks the god of longevity

Ginseng legend: (II) The grateful wife receives ginseng roots from the god of longevity

seng to China aboard the sloop "Hingham" in 1773; this load of 55 tons brought close to three dollars per pound and represented perhaps the most precious cargo ever to leave colonial ports.

Soon the lure of ginseng hunting and the monetary rewards were so considerable as to eclipse the more masculine pursuits of hunting and trapping. "Seng diggers" or "Sang diggers" were appellations used to characterize both the men who gathered these plants and the tool which they fashioned to this end. A forged iron tomahawk-like head mounted on a twenty-inch cane served the foragers well in breaking through dense foliage, eliminating serpents, in uprooting the plant, and in removing seedlings from between rocks. Dried seed is often difficult to germinate and "seng" gardens were proliferating in colonial forests under the care of enterprising gardeners. So common were these itinerant "seng" diggers that George Washington made mention of encountering them in 1784. Given the prices of pelts as opposed to ginseng, it is no wonder that in 1788 records in Philadelphia indicate that the legendary Daniel Boone sold 15 tons of ginseng to a company in that city. American prices at that time were around one dollar per pound, indicating that Daniel Boone realized greater profits from this sale than from all of his combined hunting and trapping. Perhaps he would be better characterized as an itinerant "seng" digger than as a trapper.

The growth habit of ginseng is as unusual as the form of the root. The rhizome or root has a perennating winter bud at the apex and since this bud grows upwards each year, the plant would soon grow out of the ground were it not for the root shrinking at a rate comparable to the upward growth, resulting in a peculiar root with a "neck" of transverse wrinkles. This, along with scars left by the aerial shoot at the end of a growing season permits the age of a root to be ascertained. In ancient China, roots with large numbers of such "neck wrinkles" were the most prized. A Russian authority on ginseng, Grushvitzky, examined a number of wild Asiatic ginseng plants and ascertained the oldest to be 400 years of age.

Both *Panax ginseng* and *Panax quinquefolium* were probably once a part of the herbaceous element of the Arcto Tertiary Geoflora which responded to a cooling and drying climate of the late Cenozoic fracturing the Arcto Tertiary Geoflora into its primary elements. A history of isolation in forests of east Asia and north temperate North America has led to distinctions which persuaded the botanist K. A. Meyer in 1842 to recognize two species, and to accord the specific epithet "ginseng" to the Asiatic members of the genus. Overt differences are slight, but those who have investigated the physiological activity of the two species have found the American ginseng to be inferior. Because morphological variation is so cryptic, many botanists choose to recognize but a single species of disjunct distribution.

While Asia now supports wild ginseng in Manchuria, Korea and Chinese Turkestan, it appears that at an earlier date it could be collected in the Shansi and Shensi provinces of China as well. With increasing collecting activities in Asia several centuries ago, these plants were taken into cultivation by the Chinese. While the cultivation of ginseng can be lucrative, much remains to fate. During the six or seven years required to produce really top grade roots, the plants must have optimal conditions climatically, edaphically and biotically. Bacterial and fungal disease proliferate under the conditions in which ginseng thrives and represent stiff competition for the developing seedlings as well as mature plants. Asiatic species are more difficult to grow in cultivation than their North American allies as there are more predators to contend with. Ten known species of fungi are parasitic upon *Panax ginseng.* Profits from cultivated species do not equal those of the gathered material for reason of the former being more fibrous and of lower content in the sought after principles which account for its alleged attributes.

Although the freshly dug and dried roots of ginseng appear to be similar, those who import the material can distinguish the area from which the root is obtained and whether it is cultivated or taken from nature. Subsequent treatment of Korean ginseng results in a root which is of a jasper-red color and has no epidermis. This is accomplished by several processes depending upon the grower and processor. Removing the epidermis after steaming over wine, over millet seed, over ginseng leaves, over African cola nuts, and treating the root with slaked lime are diverse practices used to reduce the root to a hard, translucent red structure.

While the general historical trend has been for North America to ship domestic roots to Asia, the trend has been altered in the last few years and the market for red Korean ginseng in this country has grown. Korea exported over $10,000,000 in 1970. Only a fraction of this went to the United States, but the market in this country is expanding with the return to herb medicines coupled with the claims coming from the Academy of Sciences of USSR in Vladivostok which has since 1949 had a permanent Ginseng Committee devoted to research on this plant.

Soviet and Chinese investigators working on therapeutic effects of ginseng root have isolated panaquilon, called panacon and panacen, alleged to stimulate endocrine secretions, raising hormonal levels in the blood. In addition to the aforementioned, Russian workers have identified panaxin, thought to be a tonic for the cardiovascular system, panoxic acid, said to aid the heart and blood vessels, vitamins B_1 and B_2, the enzymes amylase and phenolase, and ginsenin (ginsengenin). General claims made by the Russians on behalf of this root are that it serves to lower blood sugar levels, stimulates, has carminative properties, and generally is a tonic. Disease for which these workers claim ginseng to be effective are anemia, diabetes, insomnia, gastritis, neurasthenia, and general debility. Leaves of the plant are attractively packaged into "botanical fans" to make tea in combating dysentery. Russian cosmonauts have been given ginseng during their flights into space; disclosures as to effects have not generally been made available. Export figures are sufficient testimony as to the numbers of people throughout the world who subscribe to legendary ginseng therapy. Generally small slices of the root are allowed to dissolve under the tongue, or they are made into a tea. The taste is not unlike that of licorice.

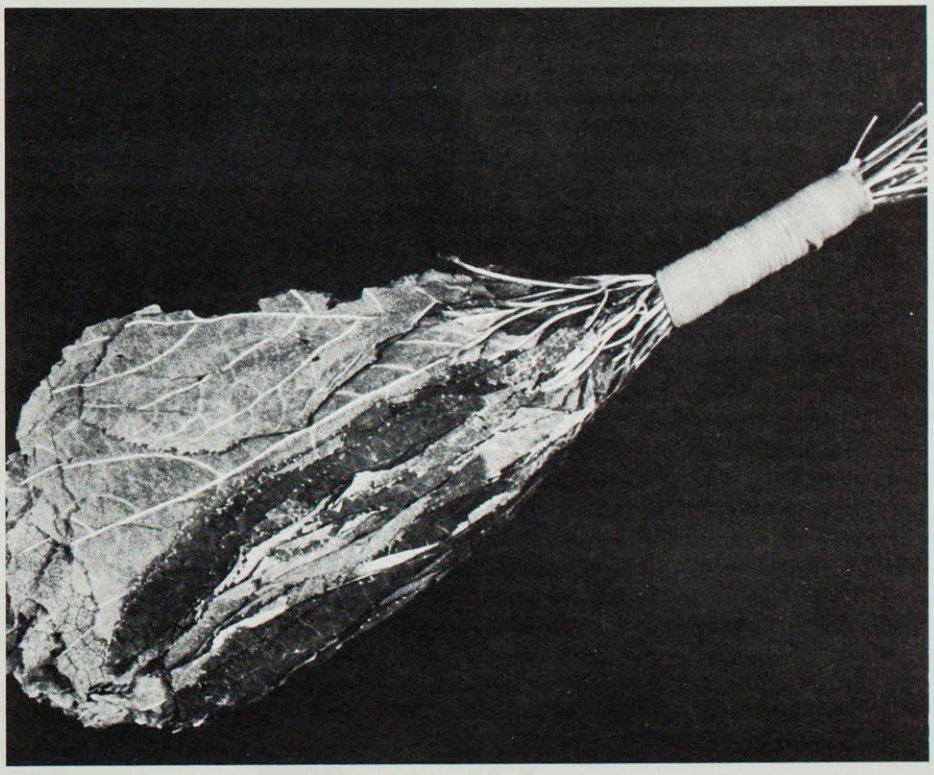
In 1969 investigators in the Institute of Biologically Active Substances, a part of the USSR Academy of Sciences, reported anti-stress studies utilizing fractions of ginseng root. They claim remedial effects in treating radiation sickness, experimental neurosis, cancer and some forms of diabetes and atherosclerosis. Asia has an enormous history of ginseng research which was summarized between the years 1918 to 1933 in the form of a seven volume work *The History of Ginseng* by Immamura Tomoe. Since 1933 additional investigations in Asia and Russia would fill a comparable number of tomes. Attitudes toward ginseng in this country have been skeptical so that the *United*

States Pharmocopoeia cited the herb for a few years as a mild stomachic tonic and stimulant, noting its use in restoring appetite and aiding in digestive affections stemming from mental and nervous exhaustion. Dr. Charles Millspaugh, who in 1887 produced an enormous tome entitled *American Medicinal Plants an Illustrated and Descriptive Guide to the American Plants Used as Homoeopathic Remedies,* wrote of ginseng in America as having physiological properties which cause vertigo, dryness of the mucous membranes of the mouth and throat, increased appetite, accumulation of flatus with tension of the abdomen, diarrhea, decreased secretion of urine, sexual excitement, oppression of the chest and a dry cough, increased heart action and irregular pulse, weakness and weariness of the limbs, increased general strength, followed by weakness, prostration, somnolence and much chilliness. He makes note that although ginseng was dropped from the *U.S. Pharmocopoeia,* it was retained in the *Eclectic Materia Medica.* Recent books on pharmacognosy in this country make no claims for the root beyond noting an "active principle" panaquilon, a saponin, a genin (ginsengenin), stigmasterol, a volatile oil of a camphor-like quality, resins, arabinose, mucilage, and starch. Legal action has been taken against those who have made claims for the root as a panacea for ailments such as cancer, rheumatism, diabetes and other diseases which Russian and Asian scientists claim can be treated or alleviated by ginseng therapy.

Despite the pessimistic attitude of U.S. medical authorities, trade in ginseng flourishes, and in 1963 three million dollars worth of ginseng (136,000 pounds) was exported from this country, most of it to Hong Kong. This was almost entirely grown on ginseng plantations as the plant has now become rare in the wild state in North America.

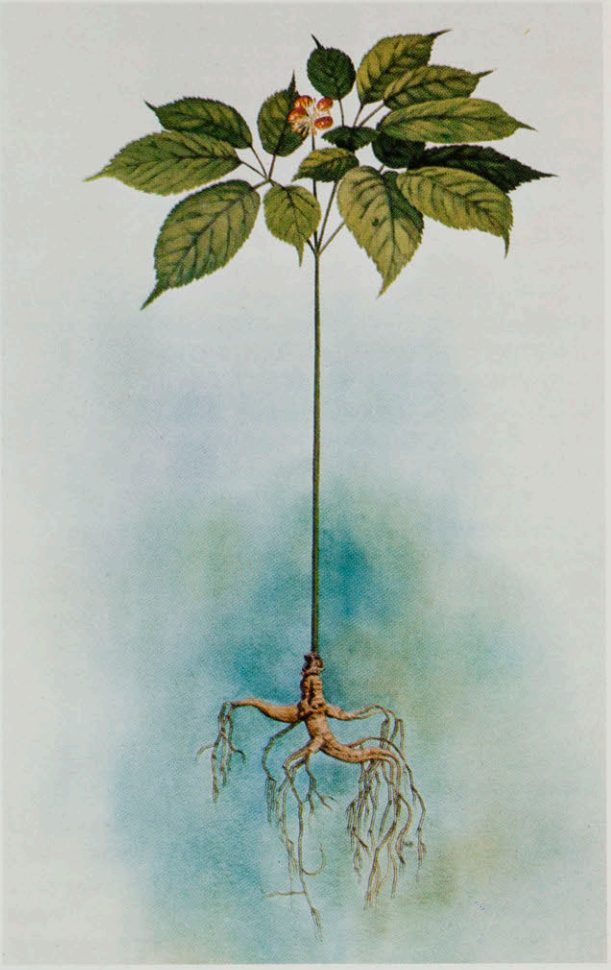
While colonists in the eighteenth century watched Indians grub for ginseng with tomahawks and sharpened sticks, they learned the curious lore surrounding *garantoquen* and soon were gathering this native medicinal ginseng plant by forging their own mattocks and invading native stands of "seng." Ginseng forays became a pleasant pastime as well as a financially lucrative endeavor. Whole families would leave their cabins for the hunt, and encountering an undisturbed stand of "seng" they might gather a hundred pounds of root in a day. So popular was this practice that

Ginseng roots: American ginseng (light) and Korean "steamed ginseng" (dark)

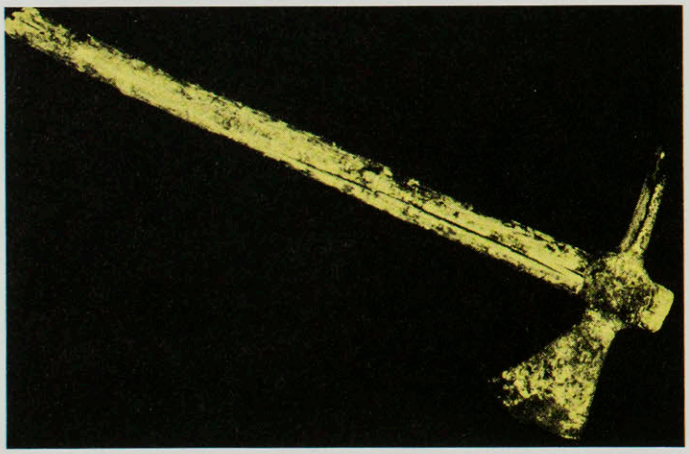


A fascicle of ginseng leaves from Korea, used to combat dysentery

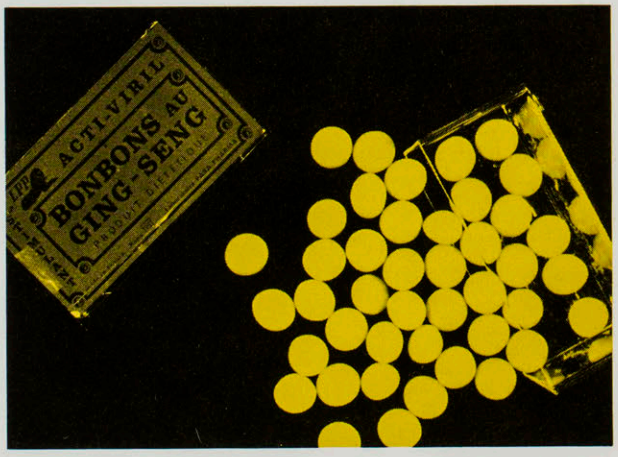
Panax
quinquifolium



Panax ginseng



Ginseng mattock: hand forged
circa early 1800s



Ginseng "bonbons" sold in
Paris as an aphrodisiac

by the nineteenth century it could be said that there were virtually no mountain cabins that were without ginseng roots. Most of the gathering was done in mixed hardwood forests among maples, beeches, basswood, rock elm and butternut. Loamy soils on the shady side of ravines provide an ideal habitat. Frequently the plants are in rocky areas necessitating the use of a mattock to unearth the root without breaking it. In the fall of the year ginseng roots are suitable for gathering and easily identified by the clusters of bright red berries that have displaced the flowers.

As native plants were threatened with extinction in the late nineteenth century, Canada enacted laws to curtail collecting except seasonally, and in New York George Stanton responded to this impending disappearance of the native herb by founding the "ginseng industry." It all began when this slight and ailing man brought ginseng seedlings from the woodlands of New York into his garden where they might achieve maturity. J. K. Bramer who was a colleague of Stanton in Apulia wrote an obituary which documents some of the earliest efforts to cultivate ginseng commercially. Bramer speaks of the tenderness with which Stanton would handle the "babies" (little plants) reminiscent of "the care a mother would show in the tucking away of a real baby in its little bed." In 1885 this bed of "babies" culminated in "The George Stanton Ginseng Farm" of 150 acres. This was something of a misnomer, for it was the native *Panax quinquefolium* rather than the Chinese *Panax ginseng* which was grown for export. As to the market for these plants, it was practically unlimited; an importer by the name of Wildman stated that at the end of the nineteenth century four hundred million Chinese used ginseng to some extent.

Varieties of ginseng were recognized by growers according to the geographical locals from which they were taken. The northern variety regularly has a green stem, conspicuous buds present as soon as the plant breaks through the ground in the spring and the berries contain two, or fewer seeds. In the southernmost distribution plant stalks are purple-green and the bud does not show until foliage has developed fully; three seeds per fruit are common. In a few regions of temperate western states a slender plant is produced with narrow leaves, a long "neck" and a long slender root. These are the principal varieties of *Panax quinquefolium* in the United States. Japan has a variety which some botanists have chosen to distinguish as a separate species, *Panax repens,* even though it approximates the Asiatic species in most respects. *Panax ginseng* is most characteristically distinguished from our native species by the corrugated seed, fleshy scales at the base of the stem which persist into maturity, and leaves with double toothed margins having nerves above covered with white hair-like bristles. *Panax quinquefolium* gathered from the wild has a greater market than the cultivated plants which are readily recognized by their firmer, heavier roots of less imaginative form.

Chinese buyers of American ginseng were interested in the forms assumed by the roots in that those approximating the human condition were considered far more marketable. A considerable prejudice existed against the Chinese buyers who sought well-formed roots in preference to the carrot-like garden cultivars. A. R. Harding, who was a well known figure among herb cultivators and gatherers and wrote a volume on ginseng and other medicinal plants in 1908, was puzzled by the Chinese he had encountered. While he believed the roots of ginseng to be the most promising agricultural export, he could not conceive what might lead these people "to have faith in a remedy with purely imaginary virtues." This he explained by saying: "The Chinese are not given to sentiment; their emotional nature is not highly developed; they are said to be a people who neither 'kiss nor cuss,' and their physical sensibilities are so dull that a Chinaman can lie down on his back across a wheelbarrow with feet and head hanging to the ground, his mouth wide open and full of flies and sleep blissfully for hours under the hottest July sun." These observations reflect the consideration generally given to Chinese who were brought to this country as slaves and exploited in the most vile manner. Harding's sensitivity to his ginseng plants obviously did not extend to his fellow man. Despite his unsupportable and stupid prejudices, Harding contributed more to the knowledge of ginseng culture than any man of his time with the probable exception of his colleague Stanton. It was the discoveries of Stanton which Harding popularized and duly acknowledged.

Advertisements which were once popular in the back of paper-pulp magazines indicated the enormous profits which could be made by ginseng growing in this country utilizing idle land which was otherwise useless. Rarely was mention made of the time and care required to produce a marketable crop, or the host of fungal, bacterial, and insect predators that delight in ginseng. Suddenly these ginseng advertisements seem resurrected, and I find before me two such entries in a recent gardening journal. One claims $50,000 per acre is possible (which in theory may be correct), another sells seed and wants to buy your crops which are purported to net you $3,000 to $30,000 annually. If you have acres of rich, loamy soil, sufficient seed, knowledge of the complexities of germination, and six or seven years to wait, the market may be such to insure you such profits. Figures on those who have realized such fortunes would be interesting. The reader may be stunned to find that he may send his money for seed and information to "ginseng mountain."

While confidence in the efficacy of ginseng is not shared by scientists East and West, this peculiar root may yet turn out to be "the wonder of the world." A common weed in Oklahoma provided seed capable of interrupting the estrus cycle in fowl leading to modern forms of birth control, and a species of *Vinca,* popular in witchcraft and herb lore now provides us with the most promising cure for several forms of cancer—will ginseng ever conquer America as it has Asia? Certainly America needs to give greater attention to its native herb lore and proceed without prejudice regarding plants which have such unparalleled histories. Two of my favorite maxims come to mind: Louis Pasteur once stated that success in science was found by those who treasure their exceptions, and Lewis Carroll advocated thinking at least one impossible thought every day. If these combined axioms were adhered to, the probability of finding efficacious medicines from old remedies would be greatly enhanced.

Acknowledgements: I would like to thank Ms. Elizabeth Russell of Herb Products Co. for "capturing an oriental herb broker" and gaining a transcription of the ginseng legend as it is portrayed on the cans shipped from Korea. Mrs. Frances Runyan and Mary Butler are to be thanked for their illustrations of p. quinquefolium *and* p. ginseng, *respectively.*

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